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## EXTENDED FLIGHT PERIODS OF COASTAL AND DUNE BUTTERFLIES IN CALIFORNIA<sup>1</sup>

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SEVERAL OF THE RHOPALOCERA that occur close to the Pacific Ocean in California have very long flight periods, giving the appearance of more than a single generation per year. Further inland these same species (often a differently named subspecies), have shorter flight periods, leaving no doubt of their being univoltine.

To illustrate, I have chosen ten examples scattered among the families Pieridae, Nymphalidae, Riodinidae, Lycaenidae and Hesperidae. In each case, one or two examples of the coastal populations are treated. These are then compared directly with populations further inland. "Inland" in some cases, may be only 20 miles or so away from the coast—if examples are available from the middle and inner Coast Ranges. In other cases, the comparisons are made with the West Slope, High, or East Slope of the Sierra Nevada.

Figures 1 and 2 name the coastal populations in capital letters, and those inland in lower case. The flight periods based on known records are shown within the bars—black for coastal populations and stippled for inland. The diagonal lines at one or both ends of most bars show the probable extensions of the flight periods based on: 1) Abundance at the beginning or end of the known collections; and 2) Fresh and/or worn specimens at the known beginning or end.

Although more ♂♂ are usually present at the beginning, and more ♀♀ toward the end of the various flight periods, in general both sexes were present throughout most of the coastal flights. Since no *Speyeria*, *Cercyonis* or *Erebia* are involved in this study, any staggered appearance of the sexes is considered negligible.

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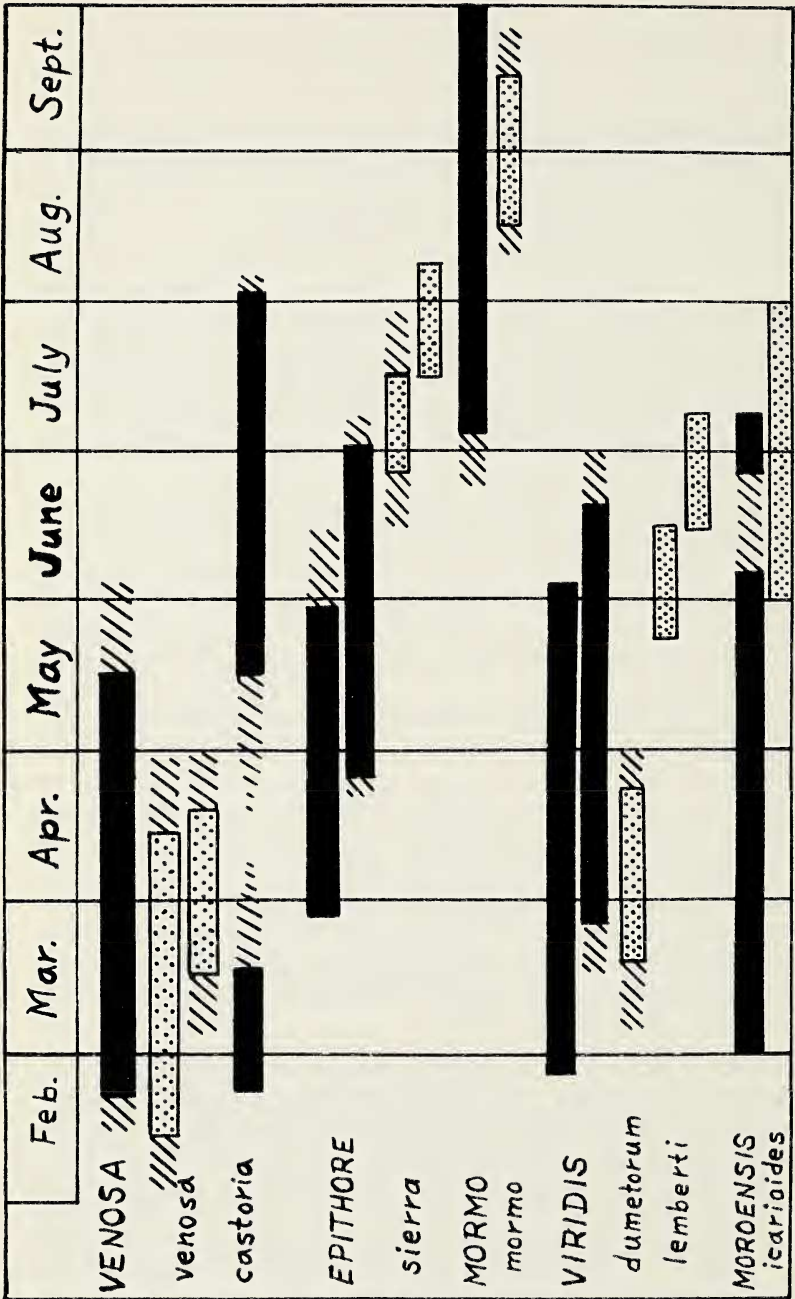


Fig. 1.—Flight periods of coastal populations (solid) and inland (stippled). Diagonal lines indicate possible extensions of seasons.

The most exact measurements of flight periods are the cases where there are sufficient records for a single season at the same locality. This data was used whenever possible. However, from my own records, and the data from several publications, it appears that most lepidopterists only visit the same location once or twice in a single season. Hence, the other records are based on the extremes of several seasons from data already published, or on the labels of the specimens. Experienced collectors tend to time their visits to obtain fresh "mint" specimens. For a study of this type, it would be advantageous for the collectors to also go after worn examples, or at least record them in field notes. Partly because of lack of worn examples, I have extended the probable seasons of some populations to later dates.

*Pieris napi venosa* Scudder

At Partington Canyon south of Big Sur in coastal Monterey County, fresh specimens of both sexes were taken on 21 Feb. 1965. Other examples were taken various seasons in March, April and May. My latest date is 15 May 1966—some worn, but several also fresh. Therefore, the season for the "true" heavily-veined *venosa* would probably extend another three weeks—into June (diagonal lines in Fig. 1).

Further inland in the Coast Ranges (Alum Rock Park, Santa Clara County; Stonybrook Canyon & Redwood Canyon, Alameda County; and even as far inland as Thompson Canyon, Yolo County) my personal records extend from mid-Feb. to mid-April. This is a combination of many seasons, and the flight period is considerably shorter than on the coast. Inland examples become smaller and have less dark scaling on the veins. Many grade into the taxon *microstriata* Comstock, relegated to a synonym of *venosa* in dos Passos (1964).

Even further inland (West Slopes of the Sierra Nevada), I have recorded it at the lower elevations from mid-March to mid-April. This is based on fewer records, so I will give it the benefit of the doubt and extend the season considerably at both ends.

Status of gen. aest. *castoria* Reakirt: Although stated in the literature (Comstock, 1927; Tilden, 1965) that this is the second brood of *venosa*, there is still some doubt. Many places where I have found *venosa* commonly, I never found any *castoria*. In fact, in my experience, *castoria* is a rather rare entity.

On the other hand, *castoria* has been found flying with the heavily-veined *venosa*. Dennis Sorg (in his 1971 Season Summary contribution) found the two together as early as 20 March 1971 near Jasper Ridge, San Mateo County. I have not seen these

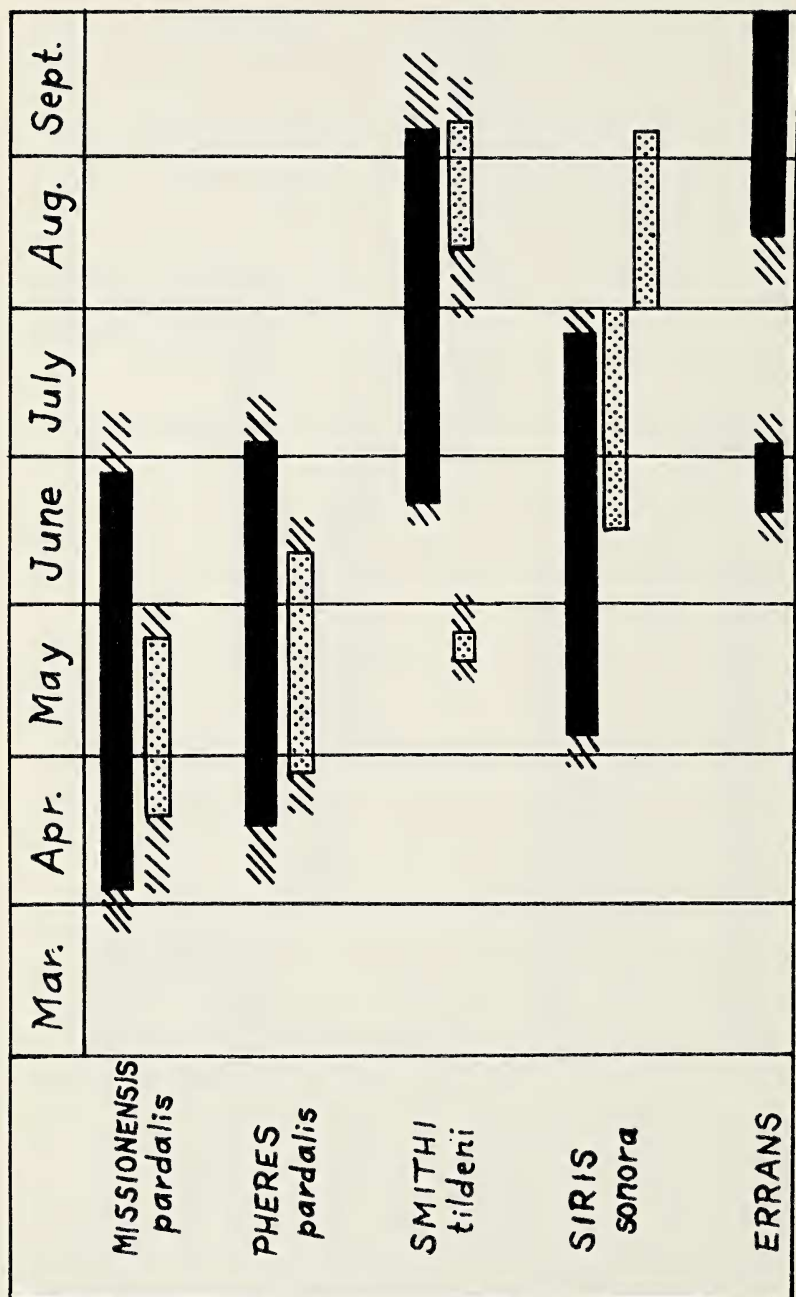


Fig. 2.—Flight periods of coastal populations (solid) and inland (stippled). Diagonal lines indicate possible extensions of seasons.

specimens. On 15 May 1966, I found *castoria* flying with fresh *venosa* at Partington Canyon. Would these actually be the second brood from those flying in February and March? If not a separate species, why are there still fresh *venosa* phenotypes present at the same time?

The season on Fig. 1 for *castoria* is probably too long, as it represents all of my records from south to north on the coast. The mid-May record compares directly as it is also Partington Canyon, and there are other records on into late June in the Big Sur area (Bruce Walsh, correspondence). The extension of the bar into August is based on a single ♀ from Van Damme Park on the Mendocino County coast. Therefore, the season is probably somewhat shorter at any single location.

*Boloria epithore epithore* (Edwards)

The upper black bar represents the one season of 1970 on the Mendocino County coast. The earliest date is mine of 28 March 1970 at Russian Gulch State Park. On 30 May 1970 it was also taken near Russian Gulch by John Emmel and several on the same date near Caspar Beach by Paul Opler. With some fresh and others worn, this single season probably extended well into June. All of this data is cited in Perkins & Meyer (1973). Some examples from north-coastal California are assignable to *B. epithore chermocki* Perkins & Perkins (see Fig. 3).

The lower black bar represents *epithore* in the Santa Cruz Mountains. Most dates are in May and June, but some in different years include late April to the first of July (Perkins & Meyer, 1973). Since this represents many seasons from the 1890's to the present, I cannot extend it much on either end for a single season.

The stippled bars denote *Boloria epithore sierra* Perkins & Meyer. The upper one represents four seasons I collected along the North Fork of the Stanislaus River, Calaveras and Tuolumne Counties. Worn examples were found in late June, 1973 at slightly above 5000 ft. I did not take it that low in the other seasons as it no doubt had already flown. The other seasons it was considerably higher—almost 7000 ft. at Wet Meadow (ridge to the south) or at Big Meadows along Highway 4 (to the north). Therefore, it is in abundance for only about two weeks at any one spot, and the season is only a little over a month—even taking into consideration an almost 2000 foot range in elevation. The lower bar denotes an even higher elevation (Tioga Pass, Tuolumne Co.) where it extends from mid-July to early August (Perkins & Meyer, 1973).

Fig. 3.—Examples from coastal populations. Most localities in California, unless otherwise noted.

Row 1.—*Pieris napi venosa*: Partington Canyon, 9 mi. S. of Big Sur, Monterey Co., ♂, ♀ 21 Feb. 1965, RLL. *Boloria epithore chermocki*: Russian Gulch, Hwy. 1, Mendocino Co., ♂ 28 Mar. 1970, RLL. *B. e. epithore*: Santa Cruz Mts., Santa Cruz Co., ♂ 15 June 1946, T. W. Davies—CAS. All following specimens leg. R. L. Langston.

Row 2.—*Apodemia mormo mormo*: Dunes W. of Seaside, Monterey Co., ♂ 4 Sept. 1969; ♀ 19 Aug. 1963. *Callophrys viridis*: San Bruno Mts., San Mateo Co., ♂ 30 Mar. 1968; Point Reyes dunes, Marin Co., ♀ 25 Apr. 1970; Fort Baker, S. of Sausalito, Marin Co., ♀ 7 Mar. 1970.

Row 3.—*Callophrys viridis*: Marina Beach dunes, Monterey Co., ♂ 11 May 1969; ♂ 16 Apr. 1973. *Plebejus icarioides moroensis*: Dunes nr. Oso Flaco Lake, 5 mi. S. of Oceano, San Luis Obispo Co., ♂ 6 June 1966; ♂ 18 Apr. 1973; ♀ 6 June 1966.

Row 4.—*P. i. missionensis*: San Bruno Mts., San Mateo Co., ♀ 2 Apr. 1972; Twin Peaks, San Francisco, ♂ TOPOTYPE, 10 Apr. 1954; ♀ TOPOTYPE, 15 May 1954; *Plebejus pheres*: Point Reyes dunes, Marin Co., ♂ 25 Apr. 1970, ♀ 10 May 1973.

Row 5.—*Philotes enoptes smithi*: Dunes W. of Seaside, Monterey Co., ♂ 24 Aug. 1962; ♀ 26 Aug. 1971; ♀ 4 Sept. 1969. *Polites sonora siris*: 3 mi. W. of Plantation, Sonoma Co., ♂ 5 May 1955; ♀ 23 July 1955.

Row 6.—*P. s. siris*: Lake Sylvania, Grays Harbor Co., Wash., ♂, ♀ 4 July 1958. *Panoquina panoquinoides errans*: Mouth of Ventura River, Ventura Co., ♂, ♀ 30 Aug. 1971; 1 mi. S. of Solana Beach, San Diego Co., ♂ 1 Sept. 1971.

